

## ELEMENT 8: SYSTEM EVALUATION AND CAPACITY ASSURANCE PLAN

The City's previous comprehensive Sanitary Sewer Master Plan and Capacity Deficiencies Report were developed by the City's engineering staff in 1979. This Capacity Deficiencies Report provided evaluation of existing system deficiencies and the recommendation of capacity improvement for the ultimate build-out of the San Jose 1990 General Plan.

In 2002, responding to rapid growth and land use development, City initiated the Sanitary Sewer Master Plan project, and completed capacity assessment of City's South, Central and North Areas (Phase I) in 2004 using San Jose 2020 General Plan, amended as of January 2003.

The second phase of the Sewer Master Plan project started in 2006 to complete the two remaining East and West Areas and update the Phase I study with additional flow monitoring data and recently approved land use policies and General Plan amendments. This study will evaluate existing system deficiencies and recommend capital improvement projects for the build-out of San Jose 2020 General Plan. Since the City is currently preparing 2040 General Plan, as one of the scenarios, the project will also evaluate the system for this planning horizon.

The Sewer Master Plan prepares a capital improvement plan that will provide hydraulic capacity of key sanitary sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event. The final plan includes evaluation of the sewer systems, establish appropriate storm event and sewer design criteria, and capacity enhancement plan. The subsequent 5-year Capital Improvement Plans will implement the capacity enhancement plan with available funding.

The following paragraphs provide a summary of the sewer master planning process. Details can be found in the Final Report and Appendices of Sanitary Sewer Master Plan (Capacity Assessment) for the South, Central and North Areas.

### **(a) Evaluation**

#### **Sewer Hydraulic Model**

City's recent Sewer Master Plan project takes advantage of the computer technologies and GIS data effectively to develop a sewer hydraulic model with sewer physical data, flow monitoring data, and land use planning data. City selected InfoWorks model (by Wallingford Software), a dynamic model which computes the time-varying flows at each point, accounting for attenuation, looping, surcharging, storage, and lost to spills.

During the master plan project, GIS sewer, flow and rainfall, census block, water use, parcel, and land use planning and development data are reviewed. The master plan staff uses a systematic process to incorporate these data into the computer hydraulic model of the trunk and interceptor system.

As an initial effort with two-year duration for each phase of the studies, the master plan project focuses on sewers 12-inch and larger in diameter. They account for approximately 15% of the entire sewer system of 2,150 miles. Approximately 6,000 pipes are included in the hydraulic model. Junction structure, weir, gates, valves, pumps are included as special control facilities.

The City is planning to include all 10-inch sewers in the hydraulic model. The 8-inch sewers within Specific Plan, Redevelopment, and Development Policy areas are to be incorporated into the sewer model. Eventually, when resources and funding are available, the model will be expanded to all public sewers within the City's service area.

#### Flow/Rainfall Data and RDII Analysis

To evaluate sewer system performance, City implemented short-term and long-term flow monitoring activities at various time periods. In 1997, City implemented a permanent flow monitoring program consisting of flow meters in 39 locations at trunk line sewers and five pump station, and rain gauges at 21 locations. The program monitored sewer flow and rainfall continuously from 1998 to 2001. In Phase I Sewer Master Plan, City deployed 107 flow meters from January to March 2003. As part of the Phase II Master Plan effort, 131 flow meters were installed for the period from December 2007 to March 2008. These dry and wet weather flow monitoring data are utilized to evaluate the groundwater infiltration and wet weather impacts in the sewer system. The City is investigating the need for a permanent flow monitoring program.

Based on dry weather flow monitoring data, the master plan study develops dry weather wastewater flow generation criteria and diurnal profiles that are representative for each land use category. The occurrence of seasonal groundwater infiltration in sewer is also analyzed. Specific areas of the City are known to have groundwater infiltration.

The wet weather flow monitoring data provide the basis of wet weather response or rainfall dependent infiltration/inflow (RDII) analysis. For this Phase I Master Plan, a 10-year frequency, 24-hour duration rainfall event was selected as design storm. The rainfall pattern was "synthesized" based on the rainfall intensity-duration-frequency curved contained in the County of Santa Clara Storm Design Requirements, and represents rainfall at the San Jose International Airport. The 24-hour design storm has a precipitation volume of 2.9 inches, which includes a 6-hour rainfall volume of 1.4 inches and peak hour rainfall of 0.6 inches. The design storm was adjusted for the various rain gauge basins to reflect the area variation in rainfall in the San Jose Area based on the rainfall isohyets in the Sanitary Sewer Infiltration/Inflow Analysis by Consoer, Townsend & Associates (February 1974).

#### Planning Scenarios

The master plan study looks at four planning scenarios: existing, near-term (5 to 7 years), long-term (2020 and 2040 General Plan). The master plan first identifies sewer system deficiencies under existing land use condition using census block, vacant land, water use and other relevant information.

For near-term scenario, the Development Activity Highlights and Five-Year Forecast (2008-2013) issued annually by the Department of Planning, Building and Code Enforcement identify near-term residential and non-residential development projects. These development potentials are included in the sewer model simulation to predict sewer system deficiencies under near-term scenario.

The City's General Plan 2020 is the current land use development guiding document. City's Planning Department is currently conducting a comprehensive update to City's General Plan, Envision San Jose 2040 General Plan Update. Both General Plan 2020 and 2040 will be used as long-term scenarios to evaluation sewer system capacity deficiencies.

### Hydraulic Modeling

Once the sewer hydraulic model is built, the model is calibrated with existing flow monitoring data. Then the model will identify sewer system deficiencies for existing, short-term, and long-term design flow scenarios using deficiency criteria.

### **(b) Sewer Design Criteria**

Sewer master plan recommends separate set of design criteria for trunk sewer system and interceptor sewer system. Details can be found in the Sewer Master Plan Phase I Final Report.

### **(c) Capacity Enhancement Measures (Capital Improvement Plan)**

The total cost estimated for the 37 capacity improvement projects was \$104 million in 2004. Using the relevant design criteria recommended for sewer master plan, project costs are estimated for each of the 37 capacity improvement projects identified by the capacity analysis. When the Phase II master plan project is completed, capacity improvement projects for East and West Areas will be recommended.

The master plan project developed a prioritization process to group recommended improvement projects. The projects are ranked based on criteria of potential for overflow, and other considerations such as surcharge at dry weather condition and location of the surcharge and potential overflow. Based on these criteria, the master plan study catalogs the recommended improvement projects into four priority groups. The first two groups are considered as short-term improvement and the other groups are necessary long-term needs. Some of these recommended projects are necessary to solve existing capacity problems, and some of them are to solve future capacity problems due to growth.

### **(d) Schedule**

Due to funding limitation, only eight high priority (first two priority groups) projects were programmed into the 2009-2013 Capital Improvement Program. City's Sanitary

Sewer Program is actively seeking funding to construct remaining high priority projects in the top priority groups. These projects will be considered in the future Capital Improvement Program when funding becomes available.